THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[FOURTH SERIES.]

No. 119. NOVEMBER 1877.

XLVII.—*On* Pteroplax cornuta, *H. & A.*

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[Plates XII. & XIII.]

IN the 'Annals and Magazine of Natural History,' ser. 4, vol. i. 1868, appeared "Notes on the Remains of some Reptiles and Fishes from the Shales of the Northumberland Coal-field," by my late friend Mr. Albany Hancock and myself.

In those notes were described two crania of *Pteroplax cornuta*, the upper surface of the smaller one being figured of about two thirds the natural size (pl. xv. fig. 1); subsequently the matrix having been more carefully removed from the surfaces of both crania, two well-defined sutures on each have been brought to light, and are seen to divide the bone which had been named postfrontal into three distinct parts—namely, the postfrontal proper, the postorbital, and the squamous.

In the present communication I propose to describe and figure, of the natural size, the upper surface of the smaller and the under surface of the larger cranium, also some ribs and vertebræ, three bones of an extremity, and some scutes, all of which most probably belonged to the same amphibian.

The crania have undergone immense pressure and are consequently much flattened. Together with the other bones they are from the black shale, a stratum varying from 3 to 4 inches in thickness, overlying the Low Main seam of coal at Newsham Colliery, near Blyth, Northumberland.

Upper surface of the smaller cranium (Pl. XII. of natural size and as seen after careful removal of the matrix).—A rib is seen lying along upon the left side of the cranium; and near its distal end a fragment, which may have belonged to it, partially overlaps the left occipital region; a third piece, the vertebral end of a rib, lies under the fore part of the skull.

It is worthy of remark that the premaxillary, nasal, prefrontal, and maxillary bones, which naturally form the anterior end of the cranium, are absent from all the three skulls of *Pteroplax* as yet known. Such a deficiency has never been met with in skulls of *Loxomma* or *Anthracosaurus*. The skull of *Pteroplax*, as we find it, consists of frontals, parietals, so-called supraoccipitals, postfrontals, postorbitals, squamous, occipitals, epiotics, and quadrate bones, all firmly united by suture.

Dimensions.—The skull thus composed measures in length, from the median line in front to the posterior ends of the epiotic horns, $6\frac{1}{2}$ inches, and from the same point to the posterior margin of the occiput on the median line 5 inches. The distance from this last point to the point of the right epiotic horn is very nearly 2 inches, and that between the points of those horns $2\frac{9}{10}$ inches. Breadth of the skull at the occipital margin $2\frac{1}{2}$ inches, at the broadest part $2\frac{9}{10}$ inches, between the posterior ends of the orbital curves $2\frac{1}{2}$ inches, between the anterior ends of the same 1 inch, over the anterior broken ends of the frontals rather more than 1 inch.

The pitted sculpturing is irregularly disposed over the surface, the pits varying much in form, size, and depth, being on the whole smaller and less deep than those of the crania of *Loxomma* and *Anthracosaurus*; on the parietal bones they are prolonged into grooves radiating from the centres of ossification on each side of the parietal foramen. The pits are most strongly marked on the postfrontals and postorbitals, and are largest and groove-like on the frontals. On these bones there is besides a channel or groove at each margin, studded with pits, probably a mucus-groove. The pits on the frontals are all inclined forwards, and look as if they served to lodge blood-vessels. None of the small punctures which exist at the bottom of the pits in *Loxomma* are visible in the pits of *Pteroplax*, any more than in those of *Anthracosaurus*.

The orbits appear to have been large for the size of the skull; their internal, concave, osseous margins, formed of the postfrontal and postorbital bones, alone remain to testify to this. They are placed where the skull rapidly tapers to the elongated frontal region. The rest of their outline was probably partly membranous or ligamentous and cartilaginous.

The prolonged and narrow anterior end of our specimen terminates abruptly at a somewhat oblique transversely fractured surface.

The frontal bones constitute nearly the whole of this narrow part of the skull, which appears slightly deviated from the straight line, as if it had received after death a blow on the left side of the anterior end, which had started the posterior end somewhat from its articulation with the parietal bones. This part is rather broader at its distal end than elsewhere.

The frontals are united to each other on the median line; behind and at each side of that line they form a retreating angle, into which are received the united ends of the parietals; external to this they articulate with the postfrontals, the posterior extremity of each frontal being received into an angle formed by the parietals and postfrontals.

The parietals occupy the chief part of the middle region of the cranium, and are of a triangular form, the base being posterior. In the middle of the median suture is the oval parietal foramen. It is large, being $\frac{2}{10}$ inch in length and rather more than $\frac{1}{10}$ inch in breadth; it is surrounded by an elongated oval space, which is somewhat elevated, the bone here being thick and strong; and outside of this is a depression of the same form, gradually rising outwards to the ordinary level of the surface of the skull. At the anterior part of the parietals the median suture has an irregular course to the left, no doubt a mere individual irregularity. On their outer borders these bones articulate, from front to back, successively with the postfrontals, the postorbitals, the squamous, the epiotic, and the so-called supraoccipitals which lie behind them.

The postfrontals are narrow, curved, and elongated, pointed in front, where they abut upon the frontals, and broader behind, where they meet the postorbitals; their internal borders, irregularly convex, articulate with the frontals and parietals; their external borders form the greater part of the concave and smooth inner margin of the orbits.

The prefrontals, which may have formed the anterior part of the inner margin of the orbits, and *the lachrymals* are absent.

The postorbitals, articulating in front with the postfrontals, internally with the parietals, and posteriorly with the squamous, are short thick bones which form the posterior part of the inner orbital margin, and present an external projection which marks the termination of that margin and to which, as well as to the similar process on the postfrontal, ligaments and other structures forming the outer wall of the orbit were

attached. Behind these projections the borders of the post-orbitals, as they go to join the squamous, are concave.

The squamous, a little larger than the last, are four-sided: the external side is convex, longer than the others, and the upper surface is convex like that of the postorbitals; these bones join in front with the last named, internally with the parietals, and behind with the epiotics. The surface-pitting is much less strongly marked on the squamous than on the two bones in front of them.

The supratemporals, the jugals, and the quadrato-jugals are not visible on the upper surface of either of our specimens.

The epiotics complete the ring of bones around the sides of the parietals, and form the posterior external angles of the cranium; these angles are produced backwards, in a conspicuous and remarkable manner, into what have been called horns, whence *Pteroplax* has received its specific name *cornuta*. The parts of the skull from which these horns project are thick and strong, standing up in a ridge, which from above the base of the horn passes forwards and then, curving inwards, is merged into the upper surface of the occiput, its external side gradually subsiding to the level of the other bones.

The epiotics are narrow bones wedged in, as it were, between the so-called supraoccipitals and the squamous and reaching the parietals; they also form a portion of the occipital surface, and with it and their horns give attachment to muscles stretching down the neck.

The so-called supraoccipitals or superior occipitals are rather narrow, elongated transversely, joining each other on the median line, and, hemmed in by the epiotics, overhang the occipital surface; their external posterior angles are more or less acute; below they articulate with the exoccipitals and the quadrates.

The occipital surface, concave vertically, is much arched from side to side, owing greatly to the epiotic horns, and presents the same slightly overhanging border that we see in the other two Labyrinthodonts of this district. Three occipital protuberances exist, one at the upper margin, another near to or at the base of the skull, the third, which is small, just below the first. These are bisected by the median suture. From a little distance on each side of these projections the vertical concavity of the surface is divided by a rather rough ridge into an upper and a lower groove; and in each runs a delicate rather obscure suture; the upper unites the so-called supraoccipitals to the exoccipitals, the lower these latter bones to the quadrates.

The true occipital is undistinguishable, and the basioccipital

probably absent. The height of the occipital surface near its middle is $\frac{3}{10}$ inch; at its outer part at the base of the horns, where the bones are very strong, and have been able to resist pressure better than other parts, it is $\frac{5}{10}$ inch.

Upper surface of the larger cranium.—This has not been figured. Having been carefully cleared of the matrix it shows all the sutures; but the bones are badly preserved and the pittings almost all obliterated. The following are its dimensions:—from the median line of the anterior broken end to the point of the epiotic horns 7 inches, from the same point along the median line to the posterior edge of the occiput $5\frac{1}{2}$ inches, from the middle point of occipital border to point of left epiotic horn $1\frac{1}{4}$ inch, between the epiotic horns $3\frac{9}{10}$ inches. The breadth of the skull at the occipital margin $3\frac{6}{10}$ inches, over the posterior margin of the parietals $3\ \frac{8}{10}$ inches, between the posterior points of the orbital curve $3\frac{4}{10}$ inches, between the anterior points of the same $1\frac{7}{10}$ inch; the breadth of the broken anterior end of the frontals is nearly one inch.

The right epiotic horn is broken off at the end; otherwise the outline of this cranium is on the whole nearly the same as that of the smaller specimen; it is rather broader, and perhaps belonged to an older animal: the frontals are worn as it were in front; but the right side appears to have the normal length, whilst the left is shortened.

Under surface of the larger cranium (Pl. XIII. fig. 1).—In this the entire under surface of the cranial vault can be seen; all the parts below are gone; the median suture of the vault throughout with the parietal foramen is visible; the palate, maxillary, and premaxillary bones are wanting, and may have been more or less cartilaginous or loosely attached; the presphenoid and sphenoid median ridge and the basioccipital, which are seen in the skulls of *Loxomma* and *Anthracosaurus*, are also gone. The quadrates at the base of the epiotic horns are the only bones of the base of the skull that remain. The horns are a good deal damaged. The articular condyle for the mandible is not to be seen. The under surface of the frontal bones is grooved on each side of a median ridge, along their whole length, as if they had formed the roof of a double nasal cavity extending from the snout to the throat.

The parietal foramen is large, open, and funnel-shaped, widening out greatly as it passes through the thickness of the cranium; it is here $\frac{6}{10}$ inch long and $\frac{4}{10}$ inch broad, whilst on the upper surface of the skull it is only $\frac{1}{4}$ inch long by $\frac{2}{10}$ inch broad. Its margin is surrounded, except in front, by a sharp ridge of bone, from which pass off laterally smaller ridges, which, dividing, enclose small smooth depressions that extend

to near the margin of the cranium. The wall of the cranium is very thick around the foramen; and from this to the occiput there extends on each side a broad raised space with a depression outside of it; the region of the posterior external angle is thick and very strongly ossified, as are also the epiotic horns. At the posterior end of the orbital curves, and corresponding to a part of the postorbital bones at their under surface, is a rough pitted space which looks like the articular surface for another bone, which is lost, but which may have formed the posterior border of the orbits.

It is possible this skull may have been much decomposed before its entombment.

The dentition of *Pteroplax* has yet to be discovered; and no mandible has yet been obtained.

Vertebræ.—These are not figured, being imperfect. On a piece of black shale $5\frac{1}{2}$ inches long by $3\frac{1}{2}$ inches broad, in my collection, are imbedded three vertebral centra and portions of two vertebral processes. Two of the centra are much less than the third, which measures in height $\frac{9}{10}$ inch, in breadth $1\frac{1}{10}$ inch, in length $\frac{1}{4}$ inch; its sides are slightly excavated, it is biconcave, and has a small notochordal foramen. One of the processes, a transverse one, is $\frac{6}{10}$ inch long by the same in breadth, and is much crushed. A zygapophysis is present, but too much injured to admit of description. The remaining process is of about the same size and in the same condition.

Ribs.—On the same piece of shale there are fragments of three ribs; the proximal ends of two are present, and, though much flattened, show well the head and tubercle; the distal end of the third exists, but is much flattened. It is the under surface, somewhat concave, which is exposed. In close relation with the head are three portions of ribs: one large fragment, showing head, tubercle, and groove, lies on the left side of the cranium; another fragment with head and tubercle lies obliquely under the cranium; a short piece of the sternal end of a rib rests in part on the occiput.

These are shown in Plate XII. The first is $5\frac{1}{2}$ inches long by $\frac{3}{10}$ inch broad; it is well and regularly arched; the curve of the bone is continued as far as the head, which ends in a concave articular surface; the tubercle, $\frac{4}{10}$ inch posterior to the head, ends likewise in a concavity for articulation. A groove runs along the under surface from near the tubercle for two thirds of the length of the rib; beyond this the surface is flattened.

The head, tubercle, and part of the groove are seen on the rib which lies under the cranium. Nothing is worthy of note

with regard to the third fragment, which may be a part of the first-named.

These ribs, lying in contact with the skull of *Pteroplax*, must be taken as having belonged to the same animal.

The ribs imbedded on a piece of shale cannot, perhaps, be proved to have belonged to *Pteroplax*; but they are of the same size, and are in other respects very like those on and under the cranium, and were found in the same part of the mine.

If this inference be correct, then the vertebræ lying with the ribs on the piece of shale are, there can be little doubt, vertebræ of *Pteroplax*.

Bones of an extremity.—These are figured on Plate XIII. fig. 3, and are only three in number, small and dislocated from their normal relation, but still very near to each other; they lie surrounded by many scutes on a slab of shale 8 inches by $5\frac{1}{2}$ inches. They appear to be the terminal bones of a digit, but whether of an anterior or posterior limb is not easy to determine. They diminish in size like digital bones: the biggest is 1 inch long and $\frac{1}{2}$ inch wide; the next is shorter and more slender; the third or smallest is pointed at the further end; with this exception the ends of these bones are concave and the sides contracted at the middle.

Scutes.—On the last-mentioned slab, and on its counterpart measuring $5\frac{1}{2}$ inches by $4\frac{1}{2}$ inches, are imbedded altogether 104 scutes, lying in the same plane, but scattered about without any order; besides these I have only one other scute on a small bit of shale in my collection.

These scutes vary in size from 1 to $\frac{3}{4}$ inch in length; and from $\frac{1}{6}$ inch at the anterior end, which is rounded, they taper to a rather sharp point behind; their upper surface on the whole is convex and their under surface concave from end to end. On their upper surface is a strong ridge nearer to one margin than the other; the former is the thicker edge and also the longer, whilst the surface slopes gradually to the other side, which is quite thin. Two of these scutes are represented in Pl. XIII. fig. 2.

It is presumed that the above are the scutes of *Pteroplax*, as they are different in form from the scutes of the two other larger Labyrinthodont Amphibia, and are also much smaller and of more delicate make, and we know of no other animal-remains in our coal-field to which they could belong. They are from the same part of the mine as the other remains herein noticed, and bear a certain proportion of size to the crania described.

The small size of the crania, their form and the smaller

number of bones entering into their formation than into those of *Loxomma* and *Anthracosaurus*, and the invariable absence of the snout, maxillaries, and mandibles are the chief characteristics of *Pteroplax cornuta*. The inferior parts of the skull being also wanting in both our instances renders it probable that *Pteroplax* had a skull much less completely ossified than either of the two animals above named, and that it partook more than they did of a batrachian or piscine character.

That it had two pairs of limbs, feet or paddles, is very probable, and that it was an air-breather is evidenced by the form, length, and breadth of the ribs, and perhaps also by the grooved state of the under surface of the frontal bones.

Of its body we know nothing beyond the scanty vertebræ, fragments of ribs, and scutes.

If, with the desire to form something approaching to a definite idea of the comparative size of our three Labyrinthodonts, we suppose the length of the animal to be seven times that of the skull, which is about the proportion in *Keraterpeton Galvani* (a comparatively short species), and if we allow two inches for the lost part of the larger specimen of *Pteroplax*, the skull of this animal, from the end of the snout to the end of the occiput, will be $7\frac{1}{2}$ inches long, and the whole length of the body 4 feet 8 inches.

By the same rule of the body being seven times the length of the head we find that *Loxomma Allmanni*, with a skull $12\frac{1}{2}$ inches long, must have measured 7 feet 7 inches; and in like manner *Anthracosaurus Russelli*, with a skull of $13\frac{1}{2}$ inches, must have had a total length of 8 feet 2 inches. The correctness, however, of this rule is questionable; and it is not easy to say what was the length of the tail in each case.

As was noticed in the 'Annals and Magazine of Natural History' for August 1876, the præmaxilla figured in a previous number as that of *Pteroplax*, and the teeth, as since shown by an examination of their minute structure under the microscope, as well as four or five fragments of mandibular bones, which had been described as "most probably belonging to the same large Labyrinthodont amphibian," all belong to *Loxomma Allmanni*; whilst the vertebræ and sternal plates, also figured and described as belonging to *Pteroplax*, are probably remains of *Anthracosaurus Russelli*.

My acknowledgments are due to my friends Dr. Embleton and Mr. William Dinning—to the former for his assistance in the above description, and to the latter for the accurate and beautiful drawings illustrative of that description.

EXPLANATION OF THE PLATES.

Plate XII.

Upper surface of the smaller cranium of *Pteroplax cornuta*, of the natural size; the portions of ribs mentioned in the text as lying upon and under the cranium are seen. *Fr*, frontal bone; *Pt.Fr*, postfrontal; *Pt.O*, postorbital; *Pa*, parietal; *Sq*, squamous; *Ep*, epiotic; *Q*, quadrate; *Ex.O*, exoccipital; *S.O*, so-called supraoccipital. The parietal foramen and the epiotic horns are sufficiently evident.

Plate XIII.

Fig. 1. Under surface of the larger cranium of *Pteroplax cornuta*, of the natural size. *Fr*, frontal bone; *Pt.Fr*, postfrontal; *Pt.O*, postorbital; *Sq*, squamous; *Ep*, epiotic; *Q*, quadrate; *Oc*, occipital.
Fig. 2, A, B. Scutes: A upper, B under surface.
Fig. 3, A, B, C. Three digital bones.

XLVIII.—*Characters of new Genera and of some undescribed Species of Phytophagous Beetles.* By Joseph S. Baly, F.L.S.

Fam. Sagridæ.

Orsodacna variabilis.

O. elongata, convexa, pube subdepressa grisea vestita, subtus cum antennis nigra, thorace rufo, ad latitudinem fere æquilongo, lateribus pone medium constrictis, disco subremote rude punctato; capite elytrisque viridi- aut cæruleo-æneis; antennis pedibusque pallide piceis, femoribus obscurioribus.
Var. A. capite elytrisque obscure nigro-violaceis, æneo vix micantibus.
Var. B. elytris apice fulvis.
Var. C. antennis elytrisque obscure fulvis, illis æneo tinctis.
Long. 2–3 lin.

Hab. Kurdistan.

Head trigonate; vertex strongly but not closely impressed with large punctures; space between the antennæ transversely excavated; lower portion of clypeus and mouth fulvo-piceous, apex of jaws nigro-piceous; antennæ rather more than half the length of the body, pale piceous, more or less stained with fuscous. Sides of thorax constricted behind the middle, obtusely rounded in front; disk sparingly clothed with coarse suberect hairs, remotely impressed with large, deep punctures. Scutellum semiovate, smooth, impunctate. Elytra broader than the thorax, parallel, convex, depressed along the suture;